

CLAIMS:

- 5      1.      A digital imaging device for capturing  
an image and generating a color signal from the image  
for application to an output device having specific  
color sensitivities, said imaging device further being  
one of many devices of the same type useful with the  
output device, said digital imaging device comprising:
- 10              a color sensor for capturing the image and  
generating a color signal from the captured image, said  
color sensor having predetermined spectral  
sensitivities;
- an optical section having predetermined
- 15      spectral characteristics, said optical section  
interposed in the image light directed to the color  
sensor thereby imparting the predetermined spectral  
characteristics to the image light, the combination of  
the spectral sensitivities of the color sensor and the
- 20      spectral characteristics of the optical section  
uniquely distinguishing this imaging device from other  
imaging devices of the same type; and
- a set of matrix coefficients uniquely  
determined for this imaging device in order to generate
- 25      an optimized color signal, said matrix coefficients  
correcting the spectral sensitivities of the color  
sensor and the spectral characteristics of the optical  
section for the color sensitivities of the output  
device.
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2.      An imaging device as claimed in claim 1  
in which the optical section includes a lens for  
directing image light from the image upon the color  
sensor, said lens having a predetermined lens spectral
- 35      characteristic, and wherein the matrix coefficients  
correct the lens spectral characteristic for the color  
sensitivities of the output device.

3. An imaging device as claimed in claim 1 in which the optical section includes a blur filter for spatially low pass filtering the image light directed upon the color sensor, said blur filter having a predetermined spectral characteristic, and wherein the matrix coefficients correct the spectral characteristic for the color sensitivities of the output device.

4. An imaging device as claimed in claim 1 in which the optical section includes an infrared cutoff filter for filtering the image light directed upon the color sensor, said infrared cutoff filter having a predetermined infrared spectral characteristic, and wherein the matrix coefficients correct the infrared spectral characteristic for the color sensitivities of the output device.

*Sub A2*  
5. An imaging device as claimed in claim 1 wherein the color sensor includes a color filter array for color filtering the image light directed upon the color sensor, said color filter array having a predetermined color filter spectral characteristic, and wherein the matrix coefficients correct the color filter spectral characteristic for the color sensitivities of the intended display device.

6. An imaging device as claimed in claim 1 wherein the imaging device comprises a digital camera.

7. An imaging device as claimed in claim 1 wherein the imaging device comprises a digital scanner.

8. An imaging device as claimed in claim 1 wherein the output device comprises a display device.

9. An imaging device as claimed in claim 1 wherein the output device comprises a printing device.

Sub A<sup>3</sup>

10. An imaging device as claimed in claim 1 further comprising a color processing section for implementing a matrix correction on the color signal in order to generate the optimized color signal, said color processing section using the set of matrix coefficients that are uniquely determined for this imaging device in order to generate the optimized color signal.

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11. An imaging device as claimed in claim 1 in which the optical section and the set of matrix coefficients are included on a sub-assembly that is removable from the digital imaging device for purpose of servicing and repair of the imaging device.

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12. An imaging device as claimed in claim 1 in which the output device is a reference device, and said matrix coefficients correct the spectral sensitivities of the color sensor and the spectral characteristics of the optical section for the reference color sensitivities of the output device.

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13. An electronic imaging system including a computer useful with an imaging device as claimed in claim 1, wherein the computer comprises a color processing section for implementing a matrix correction on the color signal using the set of matrix coefficients in order to generate the optimized color signal, and the imaging device provides the color signal together with the matrix coefficients to the computer.

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Sub A<sup>4</sup>

14. An imaging device as claimed in claim 1 in which the optical section includes a lens for directing image light from the image upon the color sensor, said lens being removable from the imaging device and having a predetermined reference lens

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spectral characteristic representative of removable lenses of this type, and wherein the matrix coefficients correct the reference lens spectral characteristic for the color sensitivities of the  
5 output device.

15. An imaging device as claimed in claim 1 in which the output device is represented by a connection space, and said matrix coefficients are part  
10 of a device profile for correcting the spectral sensitivities of the color sensor and the spectral characteristics of the optical section for the color sensitivities of the connection space.

15 *Sub A5* 16. A digital camera for capturing an image and generating a color signal from the image for input to an intended display device having specific color sensitivities, said camera further being one of many cameras of the same type useful with the display  
20 device, said camera comprising:

a color sensor for capturing the image and generating a color signal from the captured image, said color sensor having predetermined spectral sensitivities defining the color response of the color  
25 sensor;

a lens for directing image light from the image upon the color sensor, said lens having a predetermined lens spectral characteristic;

30 an infrared cutoff filter having a predetermined infrared spectral characteristic for filtering the image light directed upon the color sensor;

35 the combination of said spectral sensitivities of the color sensor and the spectral characteristics of the lens and the infrared cutoff filter uniquely distinguishing this digital camera from other digital cameras of the same type; and

a matrix storage containing a set of matrix coefficients uniquely determined for this camera in order to generate an optimized color signal, said matrix coefficients correcting the spectral sensitivities of the color sensor and the spectral characteristics of the lens and the infrared cutoff filter for the color sensitivities of the intended display device.

10            17. A digital camera as claimed in claim 16 further comprising a blur filter having a predetermined low pass spatial characteristic for low pass filtering the image light directed upon the color sensor, and wherein the matrix coefficients further correct the spectral characteristic of the blur filter for the color sensitivities of the intended display device.

20            18. A digital camera as claimed in claim 16 wherein the color sensor includes a color filter array for color filtering the image light directed upon the color sensor, said color filter array having a predetermined color filter spectral characteristic, and wherein the matrix coefficients correct the spectral characteristic of the color filter array for the color sensitivities of the intended display device.

30            19. A digital camera as claimed in claim 16 further comprising a color processing section for implementing a matrix correction on the color signal in order to generate the optimized color signal, said color processing section using the set of matrix coefficients in the matrix storage that are uniquely determined for this digital camera in order to generate the optimized color signal.

35            20. An electronic imaging system including a computer useful with a digital camera as claimed in claim 16, wherein the computer comprises a color

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processing section for implementing a matrix correction on the color signal using the set of matrix coefficients in the matrix storage in order to generate the optimized color signal, and the digital camera provides the color signal together with the matrix coefficients to the computer.

Sub A6  
21. A digital camera for capturing an image and generating an optimized color signal from the image for input to an intended display device having specific color sensitivities, said camera further being one of many cameras of the same type useful with the display device, said camera comprising:

15 a color sensor comprising a color filter array and a photosensor for capturing the image and generating a color signal from the captured image, said color sensor having predetermined spectral sensitivities defining the color response of a specific color sensor employed in the digital camera;

20 an optical section including at least a lens for directing image light from the image upon the color sensor and an infrared cutoff filter for filtering the image light directed upon the color sensor, said optical section having optical spectral characteristics comprised of a specific lens spectral characteristic which together define the optical response of a specific optical section employed in the digital camera;

30 the combination of said spectral sensitivities of the color sensor and the spectral characteristics of the optical section uniquely distinguishing this digital camera from other digital cameras of the same type;

35 a memory containing matrix coefficients uniquely determined for this camera in order to generate the optimized color signal, said matrix coefficients correcting the spectral sensitivities of the color sensor and the spectral characteristics of

the optical section for the color sensitivities of the intended display device, and

a color processing section for implementing a matrix correction on the color signal using the matrix coefficients in the memory in order to generate the optimized color signal.

22. A digital camera as claimed in claim 21 wherein said optical section further includes a blur filter for spatially low pass filtering the image light directed upon the color sensor, said blur filter having a predetermined spectral characteristic, and wherein the matrix coefficients further correct the spectral characteristic of the blur filter for the color sensitivities of the intended display device.

Sub A7  
23. A digital camera for capturing an image and generating a color signal from the image for input through an external processor to an intended display device having specific color sensitivities, said external processor including a color processing section for implementing a matrix correction on the color signal in order to generate an optimized color signal, said camera further being one of many cameras of the same type useful with the display device, said camera comprising:

a color sensor comprising a color filter array and a photosensor for capturing the image and generating a color signal from the captured image, said color sensor having predetermined spectral sensitivities defining the color response of the sensor;

an optical section including at least a lens for directing image light from the image upon the color sensor and an infrared cutoff filter for filtering the image light directed upon the color sensor, said optical section having optical spectral characteristics comprised of a specific lens spectral characteristic

which together define the optical response of a specific optical section employed in the digital camera;

- the combination of said spectral
- 5 sensitivities of the color sensor and the spectral characteristics of the optical section uniquely distinguishing this digital camera from other digital cameras of the same type;

- a memory containing matrix coefficients
- 10 uniquely determined for this camera in order to generate the optimized color signal, said matrix coefficients correcting the spectral sensitivities of the color sensor and the spectral characteristics of the optical section for the color sensitivities of the
- 15 intended display device; and

means for providing the color image signal and the matrix coefficients to the external processor.

24. A digital camera as claimed in claim 23
- 20 wherein said optical section further includes a blur filter for spatially low pass filtering the image light directed upon the color sensor, said blur filter having a predetermined spectral characteristic controlling the response of the optical section, and wherein the matrix
- 25 coefficients further correct the spectral characteristic of the blur filter for the color sensitivities of the intended display device.

- Sub A8
- 30 25. A digital camera for capturing an image and generating a color signal from the captured image, said camera comprising:

- a main assembly for housing the camera; and
- a removable subassembly including a color sensor having specific color sensitivities for
- 35 capturing the image and generating a color signal, an optical section including at least a lens and an infrared filter having respective lens and cutoff spectral characteristics, and a memory device
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containing matrix coefficients for color correcting the spectral sensitivities of the color sensor and the spectral characteristics of the optical section for the color sensitivities of the intended display device;

5           a signal processing section for processing the color signal generated by the color sensor;

          electrical connecting means for replaceably interconnecting the signal processing section and the subassembly; and

10           a color processing section for implementing a matrix correction on the color signal using the matrix factors in the memory in order to generate the optimized color signal.

15           26. A digital camera for capturing an image and outputting a color image signal to an external processor, said external processor including a color processing section for implementing a matrix correction on the color signal in order to generate an optimized  
20 color signal from the captured image, said camera comprising:

          a main assembly for housing the camera;

          a removable subassembly including a color sensor having specific color sensitivities for  
25 capturing the image and generating a color signal, an optical section including at least a lens and an infrared filter having respective lens and cutoff spectral characteristics, and a memory device containing matrix coefficients for color correcting the  
30 spectral sensitivities of the color sensor and the spectral characteristics of the optical section for the color sensitivities of the intended display device;

          a signal processing section for processing the color signal generated by the color sensor;

35           electrical connecting means for replaceably interconnecting the signal processing section and the subassembly; and

means for providing the color image signal and the matrix coefficients to the external processor.

27. A digital camera for capturing an image and generating a color signal from the image for input to an external processor operative in a connection space having specific color sensitivities defined by a set of color matching functions, said external processor including a color processing section for implementing a matrix correction on the color signal in order to generate an optimized color signal, said camera further being one of many cameras of the same type, said camera comprising:

a color sensor comprising a color filter array and a photosensor for capturing the image and generating a color signal from the captured image, said color sensor having predetermined spectral sensitivities defining the color response of the sensor;

an optical section including at least a lens for directing image light from the image upon the color sensor and an infrared cutoff filter for filtering the image light directed upon the color sensor, said optical section having optical spectral characteristics comprised of a specific lens spectral characteristic which together define the optical response of a specific optical section employed in the digital camera;

the combination of said spectral sensitivities of the color sensor and the spectral characteristics of the optical section uniquely distinguishing this digital camera from other digital cameras of the same type;

a memory containing matrix coefficients uniquely determined for this camera in order to generate the optimized color signal, said matrix coefficients being part of a device profile for correcting the spectral sensitivities of the color

~~sensor and the spectral characteristics of the optical  
section for the color sensitivities of the connection  
space; and~~

~~means for providing the color image signal  
5 and the matrix coefficients to the external processor.~~

28. A digital camera as claimed in claim 27  
wherein said optical section further includes a blur  
filter for spatially low pass filtering the image light  
10 directed upon the color sensor, said blur filter having  
a predetermined spectral characteristic controlling the  
response of the optical section, and wherein the matrix  
coefficients further correct the spectral  
characteristic of the blur filter for the color  
15 sensitivities of the connection space.

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